

SUPPORTING COLUMN AND CASSETTE USING THE SAME

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a supporting column and a cassette using the same, and more particularly to a supporting column for use in transporting substrates.

2. Description of the Related Art

[0002] In handling substrates, such as glass substrates for LCDs, cassettes are useful for holding or stowing the substrates to keep them from contacting, and thus damaging each other. In general, cassettes comprise a box-shaped resin frame equipped with pairs of supporting columns, each column having a plurality of slots. The slots are so arranged such that a group of slots in a same horizontal plane cooperate with each other to stow one substrate. Thus, a plurality of substrates can be safely stacked within a cassette, one above the other.

[0003] A supporting column 10 of a conventional cassette described in JP Yodogawa Kasei publication number H04-139741 and shown in FIG. 6, comprises a resin-made rod 11 and a metal rod 13. The metal rod 13 is located in a through hole 115 defined in the center of the resin-made rod 11. Moreover, the resin-made rod 11 is provide with a plurality of annular slots 111 defined in the resin-made rod 11, and defines a fixing slot 113 and a threaded hole 131 in each of two opposite ends.

[0004] A plurality of the supporting columns 10 are fixed to a frame (not shown) to form a cassette (not shown) by means of the fixing slot 113 and a screw

(not shown). But in use, only a small portion of the surface of each annular slot 111 actually touches the surface of a substrate. Furthermore the material making up the resin-made rod 11 must resist high temperatures and have high durability. Therefore, this circular-shape design of circle shape wastes material and is more expensive than necessary.

[0005] For the above reason, an improved supporting column with a low manufacturing cost is desired.

SUMMARY OF THE INVENTION

[0006] An object of the invention is to provide a low-cost supporting column.

[0007] Another object of the invention is to provide a cassette using the supporting columns.

[0008] In order to achieve the objects set forth above, a supporting column of the present invention comprises a main body and a stiff shaft. The main body comprises a half-sleeve shaft and a plurality of parallel wing panels encircling portions of the half-sleeve shaft. The half-sleeve shaft has a C-shaped cross section and defines an axial bore along an axial direction. The wing panels are formed perpendicular to the half-sleeve shaft and are spaced apart from one another a predetermined distance. Each wing panel provides a protrusion in the middle of the wing panel. A space interval is defined between neighboring wing panels. The stiff shaft has threaded holes defined in opposite ends thereof. In assembly, the stiff shaft is retainably received in the axial bore of the main body.

[0009] Since the supporting column of the present invention employs a half-sleeve shaft having a C-shaped cross section and a plurality of parallel wing panels, a significant savings in material used is achieved over the convention supporting column, which reduces manufacturing cost.

[0010] Other objects, advantages and novel features of the invention will become more apparent from the following detailed description of the preferred embodiment of the invention as illustrated in the accompanying drawings, in which:

BRIEF DESCRIPTION OF THE INVENTION

[0011] FIG.1 is a perspective view of a supporting column according to the present invention;

[0012] FIG.2 is an enlarged view of a portion of the supporting column of FIG.1;

[0013] FIG.3 is a side view of the supporting column of FIG.1 mating with a substrate;

[0014] FIG.4 is a perspective view of a cassette employing a plurality of supporting columns of FIG.1 and a pair of frames;

[0015] FIG.5 is a partially exploded view of a portion of the cassette of FIG. 4 showing a portion of a supporting column, a stopper member and part of a frame.

[0016] FIG.6 is a partially sectioned, side view of a conventional supporting column;

DETAILED DESCRIPTION OF THE INVENTION

[0017] Reference will be made to the drawings to describe the invention in detail.

[0018] Referring to FIG. 1, a supporting column 30 comprises a main body 31 and a stiff shaft 33. The main body 31 may be formed of resin, such as, by injection molding. The main body 31 comprises a half-sleeve shaft 319 and a plurality of parallel wing panels 317 encircling portions of the half-sleeve shaft

319. The half-sleeve shaft 319 has a C-shaped cross section and defines an axial bore 315 along an axial direction. The shape of the wing panels 317 is round or approximately round, or tongue-shaped. The wing panels 317 are formed perpendicular to the half-sleeve shaft 319 and spaced apart from one another a predetermined distance. A space interval 311 is defined between neighboring wing panels. The stiff shaft 33 is made of metal. The stiff shaft 33 has threaded holes 331 defined in opposite ends thereof. In assembly, the stiff shaft 33 is retainably received in the axial bore 315 of the main body 31.

[0019] Referring to FIG. 2 and FIG. 3, each wing panel 317 has a protrusion 318 in the middle of the wing panel 317. A size of the protrusion 318 gradually decreases from the half-sleeve shaft 319 to an edge of the wing panel 317. The supporting surface (not labeled) of the protrusion 318 is shaped like a conicity or a hill.

[0020] Referring to FIG. 4, a cassette 40 for accommodating substrates 90 (see FIG.3) includes a pair of frames 50 and a plurality of supporting columns 30. The frames 50 may be made of resin or metal. A plurality of threaded holes (see FIG. 5) is defined in opposite edges of the frames 50 for receiving screws therein. The wing panels 317 of the supporting columns 30 are arranged toward an interior of the cassette 40. The wing panels are located in a plurality of common planes and cooperate to form a plurality of supports for receiving a plurality of substrates 90.

[0021] Referring to FIG. 5, the supporting columns 30 are fixed to the frames 50 by means of pairs of stopper members 70. The supporting column 30 has a pair of fixing slots 313 at opposite ends of the half-sleeve shaft 319. Each stopper member 70 comprises a main body (not labeled) with a bulge 703 and a pair of fixing blocks 701 extending from the main body. A through hole 705 is defined

therethrough. The frame 50 comprises a plurality of recesses 501 and defines a threaded hole 503 through in each recess 501. In assembly, ends of the stiff shaft 33 are inserted into through holes 705 of respective stopper members 70 and the fixing blocks 701 are engaged in the fixing slots 313. The bulge 703 of stopper member 70 is fittingly received in a corresponding recess 501 of a corresponding frame 50. The supporting columns 30 are fixed to the frames 50 by engagement of screws (not shown) in the threaded hole 503, 331.

[0022] The supporting column 30 of the present invention has the following advantage. The supporting column 30 employs a half-sleeve shaft 319 having a C-shaped cross section and a plurality of parallel wing panels 317, so a significant savings in material used is achieved over the convention supporting column, which reduces manufacturing cost.

[0023] It is to be understood, however, than even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the extent indicated by the broad general meaning of the terms in which the appended claims are expressed.